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## APPENDIX 4

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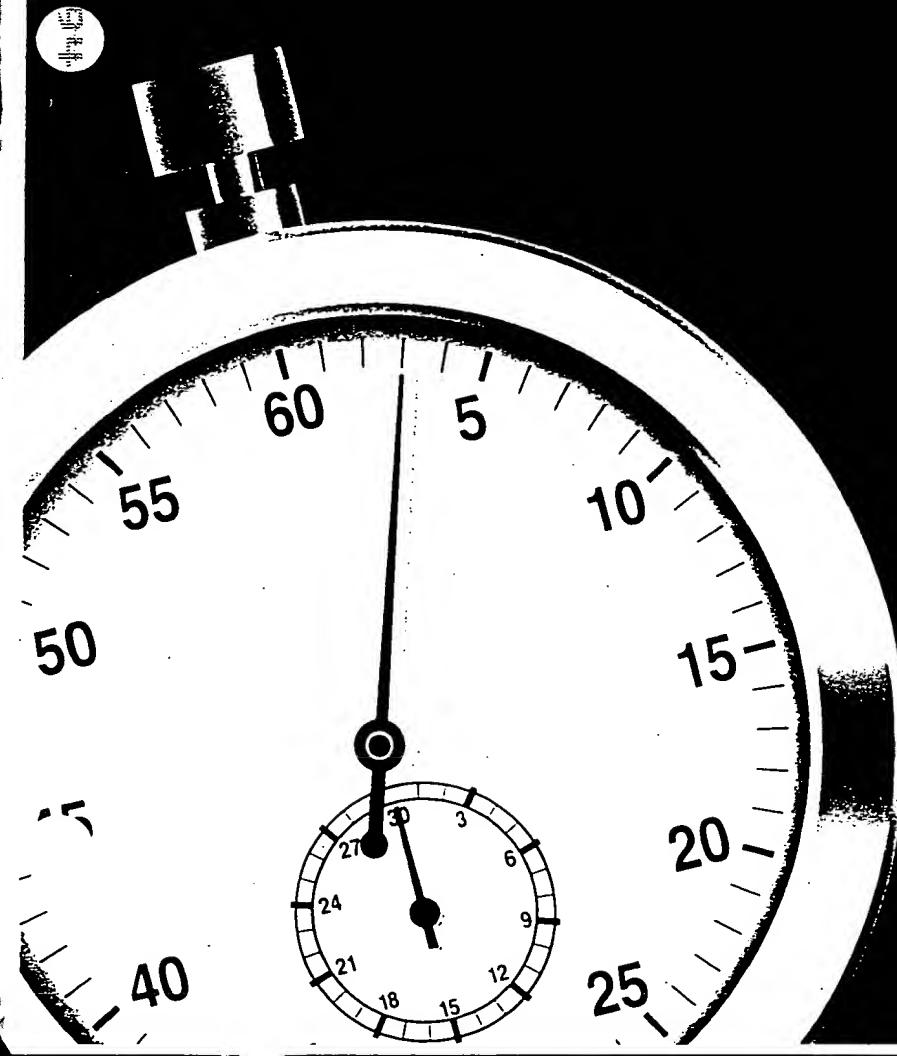
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# EMPOWER

Load Testing Software

for

Client/Server  
Applications

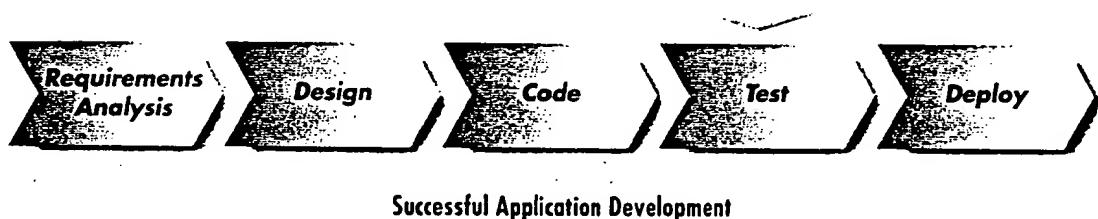


PERFORMIX

# The testing process

**Applications that are not load tested often fail during the pilot stage—and consequently BUST at full-scale deployment**

*The testing process is integral to successful application development. It consists of three stages—regression, load and pilot testing—of which load testing is the keystone.*



The complete testing process is a triumvirate of regression, load and pilot testing. The process should, ideally, be completed in that order.

**Regression testing** (also called functional or quality testing) helps avoid errors linked to a single user. It is a linear process that examines virtually all pathways through an application. Since regression testing quickly isolates inconsistencies in the interface, it is particularly useful as applications are slightly changed. Sometimes a bit of tweaking in one area produces adverse affects in seemingly unrelated spots.

**Load testing** analyzes the effect of many users upon an application. Conscientious load testing during the development process protects the application from failing under the weight of simultaneous users. Applied early in the development process, load testing gives developers an opportunity to correct problems—even if it means changing an architecture or major component—before

the problems become virtually too expensive to change.

Once deployed, it is crucial that an application works without interruptions and delays. Load testing charts response time, enabling a developer to recognize those facets of a program that hinder performance. As well, load testing ensures scalability, paving the way for a company's growth.

**Pilot testing** (otherwise known as beta testing) is the dress rehearsal before the show, the last step before full-scale deployment. It is the determination and culmination of a long, arduous development process. In a pilot test, an application is used by a subset of real users. These users exercise the common portions of the application and determine its effectiveness in helping them conduct business more competitively. Applications that have not been adequately load tested often fail during the pilot stage—and consequently crumble during full-scale deployment.

# Load testing

## **Load testing is a “no-brainer”**

Load testing is an essential step in your application development process. It affirms the success of your application by eliminating guesswork about quality and performance. By emulating multiple users simultaneously accessing an application, it quantifies the number of users your application can support and shields your company against slow response time and application failure.

Even the most organized and well thought-out development is certain to have inherent weaknesses. In complex applications, these weak spots are often hidden. Load testing ferrets out these defects and shows you how to correct them.

Without load testing, you can merely surmise about the performance of your application under the stress of many users. Why make an assumption when you can be certain?

With load testing, you ascertain the inevitable problems embedded in your application during the development process, when the comparative cost of change is minimal.

## **Knowledge is power**

The knowledge that arises from a load test helps you eliminate guesswork. By emulating many users, you determine, first and foremost, if your application will support its intended audience.

## **Time is money**

Second, you pinpoint the time each user must wait for his or her screen response. Competitiveness depends on your company's ability to do things faster and more efficiently.

## **Change is inevitable**

Third, you are primed for growth. The growing pains that naturally accompany success need not extend to your application. Load testing enables you to check and maintain your application as it grows, so you know if and when to adjust accordingly.

**If you think you don't need load testing, keep in mind the following risks.  
Few businesses can afford them.**

- The cost to repair, replace and rework your application after deployment usually exceeds the cost of testing the application.
- An application deployed prematurely causes work stoppages. When a mission-critical application halts, a company loses precious time, revenue and customers.



# Benefits of EMPOWER

## EMPOWER your application with multi-user quality, performance and scalability

EMPOWER ensures that your application will run—and run smoothly.

EMPOWER secures application performance for today and positions your business for tomorrow.

EMPOWER finds application problems before they become dangerous. It guarantees the productivity of your employees. It prepares your business for change and growth.

### Multi-user quality

Using one UNIX machine to simulate hundreds of users, the EMPOWER line of testing products creates scripts to represent actual users and their daily, often disparate, operations. EMPOWER captures user activities—including the actual keystrokes, mouse movements and SQL requests that your employees generate while using an application—and creates emulation scripts. Then, EMPOWER arranges a mix of scripts to represent the many users your application must sustain.

EMPOWER reveals if, and to what degree, your application works. Moreover, it enables you to fix intrinsic problems before deployment.

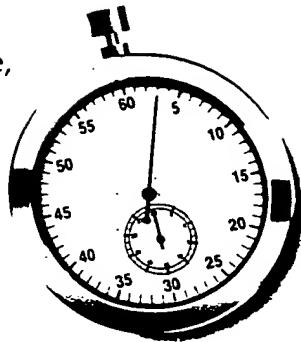
You can correct difficulties that occur when

- ▶ application code competes with other code for resources
- ▶ access to data is simultaneous
- ▶ your database and OS run out of resources
- ▶ communication subsystems falter

### Performance

Hardware, software, database and middleware vendors all laud the speed of their products.

EMPOWER verifies those claims for your primary transactions, at your peak hours of business. When you test your application with EMPOWER, you know the exact time your users must wait for critical responses, and where application errors occur.



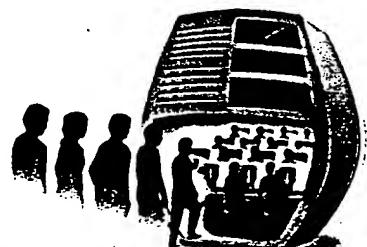
Bottlenecks become easy to find and simple to correct. When response time does not meet requirements, developers can react quickly and calmly to solve the problem.

EMPOWER permits them to

- ▶ enhance application code
- ▶ repartition code and data between client and server
- ▶ optimize database parameters
- ▶ size the CPUs and memory
- ▶ adjust disk layout

### Scalability

Likely, your business will grow and change.



Already, you have invested money and effort in an application to fulfill your present needs. Why not confirm its ability to sustain progress? EMPOWER determines the outcome, with respect to quality and response time, when your

application is forced to support a greater load. You can alter the user level, transaction mixes and rates, and complexity of the application.

EMPOWER is the only true way to verify both the scalability of components and the scalability of components as they work

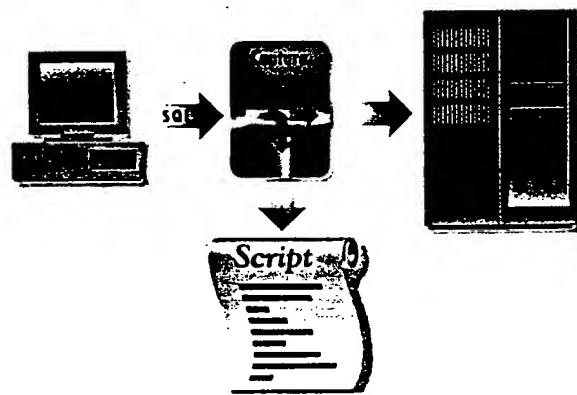
together. EMPOWER ensures that you can simply and effectively determine capacity when changing

- ▶ workload
- ▶ application code
- ▶ database size
- ▶ hardware configurations
- ▶ software revisions

EMPOWER employs script-and-go technology to build the scripts you need to load test. Script-and-go technology slashes the time needed for script development, making load testing simple and fast. As well, it guarantees the accuracy of your test results by replicating actual user activity.

EMPOWER sits between the user device—whether it be a PC with a client, an X-terminal or simply a VT100—and listens to the traffic between that device and your application. Based on the flow, EMPOWER builds a script that can replace the user device and drive your application.

EMPOWER scripts can be replayed with or without user devices. Running scripts with user devices aides debugging. Running scripts without user devices relieves you from the burden of acquiring a lot of hardware for a multi-user test.



EMPOWER uses the same language for scripts that execute with or without user devices. In fact, there is only one script for which you select the execution mode.

With EMPOWER, you can readily extend captured scripts with loops, randomize script content with if-then-else and switch statements, vary the data in updates and queries, and govern script throughput with thinking, typing and pacing delays. Unique script-and-go technology is streamlined for load testing. It minimizes script development time and maximizes your opportunity for enhancing quality and performance.

# The EMPOWER family of products

**Improve the quality and performance of your client/server applications with superior load testing software.**

Performix provides load testing software for a complete myriad of architecture—from simple character-based applications to complex, multi-tier client/server superstructures. The EMPOWER family

of products has tested thousands of applications on a vast array of hardware. It supports all major databases, operating systems, networks and application development tools.

	<b>EMPOWER</b>	<b>EMPOWER/X</b>	<b>EMPOWER/CS</b>
<b>Interface of application to be tested</b>	Character	X-Window	Windows™, Windows NT™, OS/2™, and more
<b>Traffic captured and replayed</b>	Keystrokes	X protocol	Object-oriented events and SQL

## Performix facts



Performix, Inc., was founded in 1987 with the vision that load testing would become an integral part of every application development process. In the past eight years, the number of companies embracing load testing has skyrocketed and now includes virtually all businesses with mission-critical applications. Today, Performix is a privately held and funded company with sales and support offices across the United States and in Europe.

All of the premier hardware vendors rely on Performix for their load testing needs, including HP, IBM, Sun, SGI, Sequent, Pyramid, NCR and DEC. Most of these vendors discarded in-house load testing

software in favor of EMPOWER, and saved considerable time and money doing so. The major database vendors, such as Oracle, Sybase and Informix, also depend on the technical prowess of EMPOWER.

Also relying on Performix are leading development companies across all major industries. Some of these prominent customers are AT&T, British Telecom, Sprint, Telia Data, Dow Jones, Fidelity Investments, Standard & Poors, Signet Bank, Mobil, Federal Express, DHL, Hyatt and Computer Associates. As well, major service organizations, such as Andersen Consulting, EDS and CSC, count on Performix to guarantee the success of their projects.

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# What is load testing?

Load testing is the process of analyzing the effect of many users on an application.

As part of the application development process, load testing with EMPOWER reveals performance problems before an application is deployed. By emulating users and analyzing the effect of these users on an application, EMPOWER tests the resiliency and flexibility of an application.

■ EMPOWER is widely recognized as the best-of-breed among load testing products.

■ EMPOWER is available for all types of architecture — from simple character applications to multi-tier client/server superstructures.

■ EMPOWER supports all major databases, operating systems, networks and application development tools.

■ The EMPOWER family of products has been used to test thousands of applications on a vast array of hardware.



*Improving the quality and performance of multi-user applications with superior load testing software*

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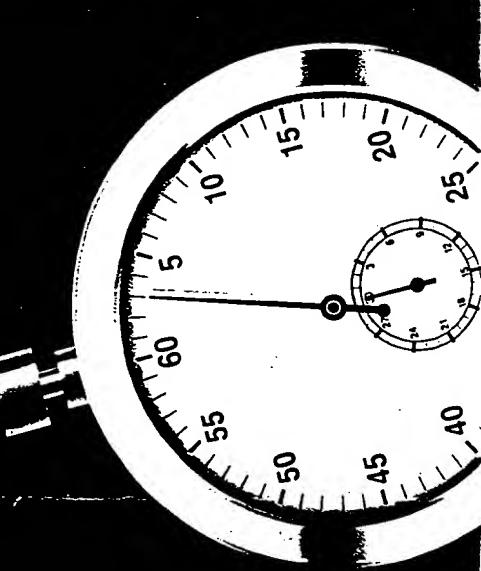
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## Load Testing Software



As companies depend more heavily on information technology to maintain a competitive edge, application development becomes increasingly rushed and complex. Companies look to their IT departments to build applications that are faster, more reliable and more flexible than ever before — in less time.

In response, developers are searching for new ways to assure the reliability, performance and scalability of their mission-critical applications. In short, to lessen the risks. Load testing is the answer. A load test provides insight about an application's multi-user behavior, enabling developers to deploy quickly and with confidence.

PERFORMIX is dedicated to improving the quality and performance of critical applications. Load testing software, enabling companies to be proactive, competitive and prepared for the future. EMPOWER software allows tests to be developed and executed with greater speed, at lower cost, and with greater functionality than ever before.

# What is EMPOWER?

EMPOWER is load

# Benefits of EMPOWER

EMPOWER your application with multi-user quality, performance and scalability.

## Multi-user quality

By simultaneously emulating multiple users, *load testing* determines, *first and foremost*, if your application will support its intended audience.

Using one machine to simulate hundreds of users, the EMPOWER line of testing products records scripts that represent actual users and, likely, often disparate, operations. With a capture agent, EMPOWER records user activities including keystrokes, mouse movements and *API* requests — to create emulation scripts. EMPOWER then arranges a mix of scripts that presents your users.

EMPOWER reveals if, and to what degree, your application works. Before deployment, you can correct common difficulties that emerge during the application development process.

## Performance

*Load testing charts the time you must wait for screen responses. It finds hidden bugs and bottlenecks and gives you the chance to correct them.*

All hardware, software, and *middleware* products, EMPOWER shows you how fast they work within your prescribed environment, for your primary transactions, during your peak hours of business. When you test your applications with EMPOWER, you know the exact time your users must wait for critical responses, and where application errors occur.

Bottlenecks become easy to find and efficient to correct. When response time does not meet requirements, developers can react quickly and calmly to solve problems.

## Scalability

*Load testing enables you to check and maintain your application as your workload increases, so you can adjust your system accordingly.*

Likely, your business will grow and change. Already, you have invested money and effort in an application to fulfill your present needs. Make sure you confirm its ability to sustain progress. When your application is forced to support a

## Script-and-Go Technology

*Performix script-and-go technology captures user activity, builds scripts and replays these scripts against both client and server.*

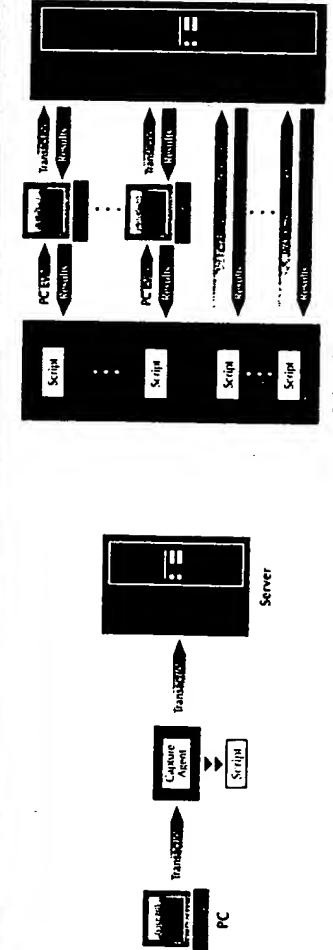
The most important feature of script-and-go technology is its capture agent. By definition, this component guarantees the accuracy of any load test. For EMPOWER/CS, the capture agent seizes SQL transactions as they leave the PC on their way to the server. During replay, these same "freeze-framed" transactions rest the server. Since there is no proven, foolproof method to recreate communication between a PC and server without a capture agent, EMPOWER/CS is the only solution that provides valid results.

## Capture with EMPOWER/CS

EMPOWER then arranges a mix of scripts that presents your users.

EMPOWER reveals if, and to what degree, your application works. Before deployment, you can correct common difficulties that emerge during the application development process.

## Load test with EMPOWER/CS



You can alter the user level, transaction mixes and rates, and complexity of the application. EMPOWER is the only way to verify both the scalability of components and the scalability of components as they work together.

## Deploy application with

- Efficient SQL statements
- Highly-tuned databases
- Properly-sized hardware
- Optimal data and code partitioning
- Adequate database and OS resources
- Data integrity during concurrent access

The beauty of EMPOWER is that a developer can put loops around the transactions to extend the captured activity and change data in the transactions to make multiple iterations more realistic. With simple programming changes, the replayed stream will represent exactly the PC requests that would be generated if an end-user continuously operated your application.

## About Performix

Founded in 1987, Performix develops, markets and supports load testing software for companies developing medium to large, mission-critical applications. All of the premier hardware and database vendors rely on Performix to measure and improve their products, and to demonstrate their applications' capacity under heavy load. Performix was the first company to develop load testing software for X-Windows and the first company to release a client/server load testing product. Today, Performix is a privately held and funded company with headquarters in McLean, Va.

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